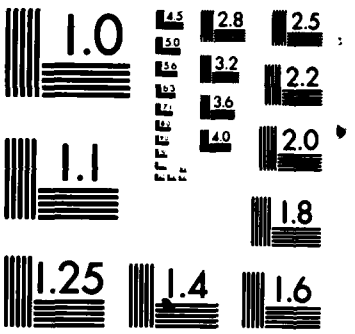
AD-A172 239 ANALYSIS OF SCATTERING DATA FROM A THIN-SEDIMENT AREA FOR THE BOTTOM INTE.. (U) SCIENCE APPLICATIONS INTERNATIONAL CORP MCLEAN VA L B DOZIER 14 APR 86 1/1

UNCLASSIFIED SAIC-86/1668 N00014-85-C-0209 F/G 20/1 NL



FINAL REPORT FOR CONTRACT N00014-85-C-0209: ANALYSIS OF SCATTERING DATA FROM A THIN-SEDIMENT AREA FOR THE BOTTOM INTERACTION PROGRAM

SAIC-86/1668

SAIC™
Science Applications International Corporation

FINAL REPORT FOR CONTRACT N00014-85-C-0209: ANALYSIS OF SCATTERING DATA FROM A THIN-SEDIMENT AREA FOR THE BOTTOM INTERACTION PROGRAM

SAIC-86/1668

Science Applications International Corporation

Post Office Box 1303, 1710 Goodridge Drive, McLean, Virginia 22102, (703) 821-4300

N00014-85-C-0209
14 April 1986

Report SAIC-86/1668

FINAL REPORT FOR CONTRACT N00014-85-C-0209: ANALYSIS OF SCATTERING DATA FROM A THIN-SEDIMENT AREA FOR THE BOTTOM INTERACTION PROGRAM

Prepared by

Lewis B. Dozier
SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
1710 Goodridge Drive
P.O. Box 1303
McLean, VA 22102

14 April 1986

Final Report for Period 15 February 1985 - 14 February 1986

UNLIMITED DISTRIBUTION

Prepared for

NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY
NSTL Station, MS 39529

OFFICE OF NAVAL RESEARCH
Department of the Navy
800 N. Quincy Street
Arlington, VA 22217

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER SAIC-86/1668	2. GOVT ACCESSION NO. AD-A172	3. RECIPIENT'S CATALOG NUMBER 239
4. TITLE (and Subtitle) Final Report for Contract N00014-85-C-0209: Analysis of Scattering Data from a Thin-Sediment Area for the Bottom Interaction Program		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER SAIC-86/1668
7. AUTHOR(s) Lewis B. Dozier		8. CONTRACT OR GRANT NUMBER(s) N00014-85-C-0209
9. PERFORMING ORGANIZATION NAME AND ADDRESS Science Applications International Corp. 1710 Goodridge Drive McLean, VA 22102		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Ocean Research and Development Activity NSTL Station, MS 39529		12. REPORT DATE April 1986 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Office of Naval Research Department of the Navy 800 North Quincy Street Arlington, VA 22217		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Northeast Pacific
Thin Sediments
Spreads (Angle, Time, and Frequency)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document is the final report for Office of Naval Research Contract Number N00014-85-C-0209. The work under this contract was conducted by Science Applications International Corporation (SAIC) during the period from 15 February 1985 through 14 February 1986.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

TABLE OF CONTENTS

N00014-85-C-0209
14 April 1986

FINAL REPORT FOR CONTRACT N00014-85-C-0209: ANALYSIS OF SCATTERING DATA FROM A THIN-SEDIMENT AREA FOR THE BOTTOM INTERACTION PROGRAM

1. INTRODUCTION

1.1 Contract Information. This document is the final report for Office of Naval Research Contract Number N00014-85-C-0209. The work under this contract was conducted by Science Applications International Corporation (SAIC) during the period from 15 February 1985 through 14 February 1986.

1.2 Reports. There are two technical reports submitted under this contract:

(1) C.W. Spofford, S.R. Moore, E.S. Holmes, and L.B. Dozier, "Angle, Time and Frequency Spreads from a Thin-Sediment Area of the Northeast Pacific Ocean (U)", SAIC Report No. SAIC-86/1666, 14 April 1986.

(2) W.E. Farrell and W.F. Monet, "Shallow Sub-bottom Reflectors in the N.E. Pacific: Distribution and Physical Properties," SAIC Report No. SAIC-86/1667, 14 April 1986.

2. TASK: ANALYSIS OF SCATTERING DATA FROM A THIN-SEDIMENT AREA

2.1 Statement of Work. The Contractor shall analyze scattering data from a thin-sediment area for the Navy's Acoustic Bottom Interaction Program. This work shall be conducted in general accordance with the Contractor's Proposal Number 1-423-71-850-08 entitled "Analysis of Scattering Data from a Thin-Sediment Area," dated 8 October 1984, of which page 3-1 is incorporated herein by reference.

That page reads as follows: Science Applications International Corporation will analyze available horizontal and vertical array data acquired during Overbid Leo Leg 4 to estimate angle and time spreads versus grazing angle and number of bounces of bottom-bounce signals in thin-sediment areas. Comparisons with existing theories will be made to evaluate their ability to model these phenomena using independent environmental data. Should these theories be inadequate, empirical scattering cross sections will be derived to support systems engineering calculations.

2.2 Data Analysis. SAIC processed the available Overbid Leo Leg 4 data for horizontal angle spreads, frequency spreads, and time spreads. These spreads were quantified and displayed in contour plots and three-dimensional surface plots. Results are presented in Technical Report (1) listed above. For all of the available data, the experimental geometry was such that at least four (or possibly three in some cases) bottom bounces had occurred.

2.3 Comparisons with Existing Theories. A theory of single-bounce angle spreads (assuming geometric scattering off slopes) recently developed at SAIC by Zabal, Brill, and Collins (J. Acoust. Soc. Am. 79, 673-680 (1986)) was used for comparison with angle spreads found in the data. This theory could not account for the observed angle spreads under any reasonable hypothesis of how the one-bounce spread should accumulate over four bounces.

A simple single-scatter model, where the dependence on angle of scatter was a normalized Gaussian distribution, was surprisingly effective in matching the time and angle spreads observed in some of the data.

2.4 Empirical Scattering Cross Sections. It was found that empirically, time spreads found in this data were not unlike spreads that could be estimated from other data taken in similar areas. Together, these data sets give us a consistent estimate of time spreads in thin-sediment areas.

2.5 Geologic and Geophysical Data. For bounds on seafloor roughness needed for input to the models discussed above, and for more insight generally into the physical mechanisms at work in thin-sediment areas, SAIC prepared a brief synopsis of geologic and geophysical data collected in such areas between the Mendocino Fracture Zone (38° N latitude) and the Murray Fracture Zone (30° N latitude), and between 128° and 160° W longitude. This synopsis has been delivered as Technical Report (2) listed above. The focus of this report is to provide a physical model of sub-bottom reflectors, including volcanic ash, chert and basaltic basement, in order to help explain the acoustic signature of paths which propagate through seafloor sediments and interact with these reflectors.

END

10-86

DTIC